AN UNDESCRIBED GENEA FROM MICHIGAN[1]

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(With Plate 20)

The known Tuberaceae from Michigan are few in number. In 1908 Dr. C. H. Kauffman[2] reported *Tuber lyoni* from near Ann Arbor and in 1911[3] he reported from Allegan County a species identified by him as *T. borchii,* and recently described by Miss Gilkey[4] as a new species *T. canaliculatum.* Aside from these there appears to be no published report of the occurrence of fungi of this family in Michigan. In California, on the contrary, twelve genera are recorded and many species, mainly through the work first of H. W. Harkness,[5] and more recently of Miss Gilkey.[6] Whether this great superiority in the number of known species is a true index to the relative frequency of occurrence of these forms in California and elsewhere in the country can be determined only when other botanists make as thorough a search for them as did Harkness, Miss Gilkey, and their collaborators. In California these workers made deliberate search for these forms; elsewhere their discovery has been mainly a matter of chance.

In August, 1919, the senior author found a dozen or more specimens of a hypogaeous fungus at a point in Gogebic County,

[1] Contribution 65 from the Department of Botany, Michigan Agricultural College.

[2] Kauffman, C. H. Unreported Michigan fungi for 1907 with an outline of the Gasteromycetes of the state. Mich. Acad. Sci. Rept., 10: 63–84. 1908.

[3] Kauffman, C. H. Unreported Michigan fungi for 1910, with outline keys of the common genera of Basidiomycetes and Ascomycetes.

Ibid., 13: 215–249. 1911.

[4] Gilkey, H. M. Two new truffles. Mycologia, 12: 99–101. *Fig. 1.* 1920.

[5] Harkness, H. W. California hypogaeous fungi. Proc. Calif. Acad. Sci. 3d Ser., 1: 241–293. 1899.

[6] Gilkey, H. M. A revision of the Tuberales of California. Univ. of Calif. Publications Botany, 6: 275–356. *pls. 26–30.* 1916.

Michigan, not far from the Wisconsin line. They were found at a depth of three to eight centimeters in the black soil forming the upper ten centimeters or so, of the soil of a forest consisting of sugar maple, hemlock, yellow birch and balsam fir. The soil below this depth consisted of gray sand, moist but not wet. The black upper soil consisted of sand with a large admixture of leaf mold, with numerous needles of balsam fir throughout it, as well as roots and underground stems of various plants such as *Lycopodium lucidulum, Coptis trifolia, Oxalis acetosella, Dryopteris* sp., and *Viola* sp.

The fruiting bodies were found scattered at distances of two to ten centimeters throughout an area of about one square meter, the soil in this region being scantily filled with a loose gray mycelium which did not show on the surface of the soil and was not noticeably more abundant near the fruiting bodies.

The single, somewhat lobed cavity and distinct central opening and the slender paraphyses extending beyond the cylindrical eight-spored asci determine the fungus as belonging to the genus *Genea.* From *Hydnocystis* it differs in the somewhat lobed cavity and secondary cortex formed by the paraphyses projecting beyond the asci.

From the described species of *Genea* this fungus differs in its spore characters. Ordinarily the spores are spherical or slightly ellipsoidal and marked by papillae or warts; in these Michigan specimens the spore have no signs of warts or papillae but are smooth, except that the epispore may show some irregular folds. The spores, moreover, are not spherical or ellipsoidal, but in side view appear square or rectangular, except the apical spores which may be irregularly rounded. Through mutual pressure of the asci and paraphyses the former and their enclosed ascospores are more or less polygonal in cross section and in some cases almost square. In the latter case the central ascospores are actually cubical as they always appear to be when viewed from the side.

The hyaline spores when mature possess a spherical or slightly ellipsoidal hyaline endospore surrounded by a hyaline exospore that is often only very slightly developed laterally, but very much

thickened at the end of the spores; particularly of those spores at or near the apex of the ascus. This exospore is externally thrown into folds but never into warts, prickles or tubercles.

Genea cubispora sp. nov.

Ascocarp when dry 7 to 9 mm. in diameter and 5 to 8 mm. in vertical thickness, slightly larger when fresh, with somewhat cerebriform external folds and involutions which have a tendency to radiate from the central opening. When fresh the whole surface was isabelline in color, but when dry and after handling the exposed convex edges of the folds are castaneous. Surface mealy and very slightly pubescent, surrounding mycelium scanty. Cavity single, but thrown into irregular pockets by the folds and involutions of the surface. Opening central, 1 to 2 mm. wide, the edge turned in nearly to the base of the cavity. Ascocarp wall 700 to 800 μ thick, the outer 100 to 150 μ consisting of large pseudoparenchymatous cells, the next 100 to 150 μ of tangled, frequently septate hyphae 5 to 10 μ in diameter, the remaining 500 to 600 μ consisting of the hymenium. Hymenium continuous, not areolate; asci cylindric, 300–350 $\times$ 25–30 μ, rounded at the apex and tapering abruptly at the base. Paraphyses filiform, occasionally, but indistinctly, septate, overtopping the asci 75 to 110 μ and forming a secondary cortex. Ascospores eight, monostichous, the basal and central ones almost isodiametric, 27–28 $\times$ 24–28 μ, the one or two nearest the apex often longer, 36–42 $\times$ 24–28 μ. Lumen of spores 14–18 μ wide and 16–22 μ long; the endospore 1.2–3 μ thick. Epispore laterally 0.2–4 μ in thickness and 2–4 μ thick on the ends of all the spores except those at or next to the apex where the thickness reaches 5–10 μ. Epispore thrown into irregular folds but without papillae, tubercles or reticulations. Ascospores polygonal in cross section, occasionally even square.

In black leaf-mold 3 to 8 cm. below the surface in forest consisting of dense growth of *Acer saccharum, Tsuga canadensis, Betula lutea* with considerable *Abies balsamea*. Between Bass and Little Bass Lakes of the Cisco Lake chain, Gogebic County, Michigan, August 14, 1919. No. 123 Bessey and Darlington.

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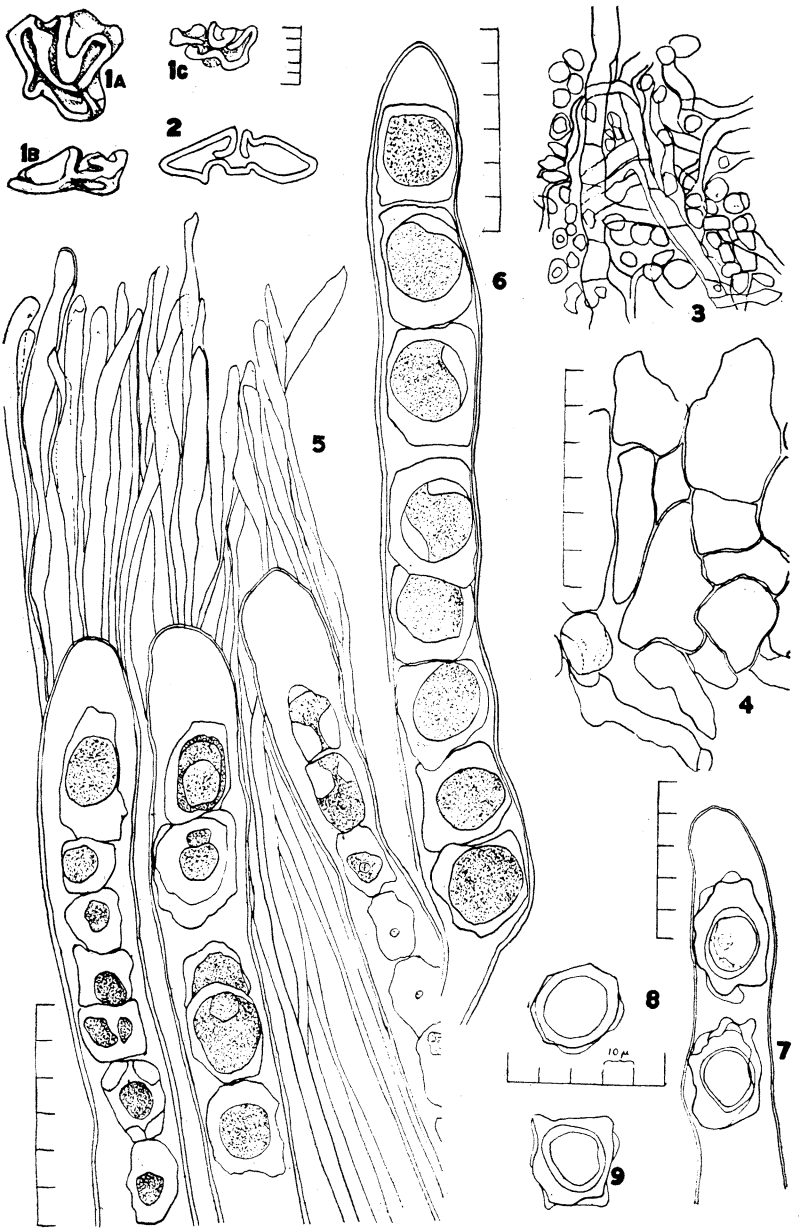

GENEA CUBISPORA BESSEY & THOMPSON

EXPLANATION OF PLATE 20

Fig. 1*a*. Top view, 1*b*, edge view of same ascocarp, and 1*c*, top view of another ascocarp. Natural size.

Fig. 2. Vertical section through ascocarp. Natural size.

Fig. 3. Tissues from middle of wall of ascocarp.

Fig. 4. Tissues from exterior of wall of ascocarp.

Fig. 5. Upper portion of hymenium showing paraphyses extending beyond the asci in a sort of secondary cortex. Ascospores and asci not quite mature.

Fig. 6. An ascus with ascospores not quite mature.

Fig. 7. Apex of ascus showing two mature ascospores.

Fig. 8. Ascospore in cross section.

Fig. 9. Lateral view of a middle or basal ascospore.

NOTE: The small divisions of the scales accompanying the figures represent millimeters for Figures 1 and 2, and 10 μ in all the remaining drawings. Figures 3 and 4 are drawn to the same scale.